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was printed the *Extrait du procès-verbal* which de Galway prints on pages 150-169. He also prints some unpublished police reports on Miranda in 1793. In general these documents illustrate certain phases of Miranda's career in France.

Scattered through the book are a few unpublished documents which deal with Miranda and Spanish America. On pages 103-113 is an anonymous report on Miranda, apparently emanating from some person in London, which is wrongly ascribed to the year 1796. Three pages are occupied by an extract from a manuscript memoir written in 1801 by Jean-Baptiste Dubois. On pages 127-130 are printed two brief police reports on Miranda's activity in London in 1810. In the judgment of the reviewer, the contribution made by these documents to our knowledge of Miranda as a promoter of revolts in Spanish America is almost negligible.

Not all of the iconographic material deals with Miranda: one of the half-tones in the beginning of the volume is a picture of President Gomez of Venezuela; the other frontispiece is from the portrait of Miranda at Versailles. The picture of Miranda opposite page 16 is after a rare engraving by Bonneville preserved in the Bibliothèque Nationale. On the next page is found a reproduction of the cut published in 1810 by Antepara. A picture of Señor José Gil Fortoul, the distinguished author and publicist of Venezuela, appears beside the painting of the Venezuelan artist, Martin Tovar y Tovar, which depicts the signing of the declaration of independence of Venezuela on July 5, 1811. The book also contains a half-tone of a painting by another Venezuelan artist, Arturo Michelena, which portrays Miranda in the prison of La Caracca at Cadiz. It contains a representation of the monument and statue erected to Miranda at Carácas as well as representations of a number of medals which have been struck to commemorate Miranda's military services. The author has made an interesting collection of the most accessible iconographic material which relates to Miranda.

At the end of the volume there is a very incomplete bibliography accompanied by a notice of the pieces of music which have been written in honor of Miranda and by a mention of the Venezuelan issue of postage stamps which bore his portrait. There is no index. This unsystematic book has a claim to a place among the curiosities of historical literature.

W. S. ROBERTSON.

Robert Fulton, Engineer and Artist: his Life and Works. By H. W. DICKINSON, A. M. I. Mech. E., Assistant Keeper, the Science Museum, South Kensington. (London and New York: John Lane. 1913. Pp. xiv, 333.)

THE author has special qualifications for the work he has done. His position has made the productions of the early days of steam engineering actualities and not merely dim historical mementos. Above all, his knowledge of engineering science has enabled him to analyze Fulton's

career, to grasp its real significance and the progress of the evolution of his ideas, and to set them out so that the reader may appreciate, almost for the first time, Fulton's true position in the history of steam navigation, and particularly that his success was not a happy accident but was the result of the intelligent application of scientific principles, deduced to a considerable extent from his own experiments.

The book is entitled, *Robert Fulton, Engineer and Artist*, and is written from that viewpoint; in other words, it does not aim at being a complete biography in the sense of telling of his social life as well as his work, although it is far indeed from being a mere chronicle of experiments. But the feature of his work as artist and as engineer is foremost, and we think, in this respect, it is the best life of Fulton which has been written; it is probable that the same may be said of the book as a whole. The reader becomes convinced, as he proceeds, that the author has fully maintained the statement in the preface that his aim has been to be impartial while sympathetic.

We are told briefly of Fulton's early life and first work as an artist in Philadelphia, and then of his stay in London, his training under West, and of his rather brief career as a painter, including the fact, however, that some of his paintings were exhibited at the Royal Academy and the Royal Society of British Artists.

Another chapter tells of the beginning of his interest in engineering work, of some of his early schemes, and of a crude model and tests of a power boat. This was characteristic of Fulton's work always—to test his ideas experimentally, if possible.

At this period he became greatly interested in canals, a subject which he never entirely abandoned, and he devised a scheme for transferring canal-boats from one level to another by inclined planes. His artistic ability was very useful in making drawings of his devices, many of which are reproduced.

Going over to France, primarily to urge his system of small canals, he became a friend of the Barlows, a friendship which lasted for life, and was of the greatest benefit in providing sympathetic interest and encouragement. In 1797, Fulton conceived the idea of a submarine boat for exploding torpedoes or mines under war vessels. As with most of his ideas, he was not the originator, but he brought his engineering ability, powerful mind, and sound practical judgment to advancing the cruder ideas of predecessors to actual working conditions. Mr. Dickinson gives the complete story, in English, for the first time, we believe, of Fulton's really wonderful work with submarines, which went as far as was possible in the absence of any power other than manual. It is very interesting to note how, almost a hundred years before the recent perfected submarine, he had discovered and applied many of the features essential to the latest boats of this type.

Meanwhile, in order to provide the means for his experiments, he became an artist again and painted a panorama in a building forty-six feet in diameter. This proved a great success.

Suggested, perhaps, by the submarine experiments, was another scheme for submarine mines or torpedoes, which, however, were to be placed by towing from ordinary boats and drifting under the bottom of the enemy's ships. This was submitted to the French authorities and tested successfully, but this method of warfare did not suit the sea-dogs of the time.

Chapter VII. tells of Fulton's first serious attempt to build a steamboat, giving a preliminary résumé of the "state of the art" by sketches of the work of Rumsey and of Fitch in America and of Miller and of Hulls in Britain. The experiments of Fulton at Plombières are described, and we learn of possibly the first crude attempt at an "experimental tank", now so important in marine design. Chancellor Livingston appears and becomes Fulton's partner. The test of the actual steamboat on the Seine is described.

Even before this, he was planning for the boat which was to be the first commercially successful steamer, the *Clermont*, and was negotiating with Boulton and Watt for the engine, to be shipped to America.

Chapter VIII. gives the story of Fulton's return to England and of his employment by the Admiralty to develop his scheme of floating submarine mines or "carcasses"; of the experiments and of actual attacks upon the French fleet at Boulogne, which, however, were unsuccessful. It is pleasant to note that he was generously rewarded for his efforts, receiving in all some £15,000. The engine for the *Clermont* was built meanwhile and shipped to New York.

In the next chapter Fulton returns to New York and begins the building of "the steamboat". This alone does not take all his energy, for we find him writing about canals and interesting the government in his submarine mines. A test was given, but the hulk was protected by booms and nets, so that the mines did no damage.

We then have the story of the completion and test of the *Clermont* and of her famous trip to Albany on August 19, 1807, which inaugurated commercial navigation. The success of this first season led to the building of other steamboats for the Hudson and for Long Island Sound, and for the ferries on the Hudson and East rivers.

The litigation about the monopoly granted by the state of New York is given fully, as well as an account of the building of steamers for the Ohio and the Mississippi. The part played by the Stevens family in steam navigation is told. A full account of the building and trial of the *Demologos*, the first steam war vessel, is given, followed by the closing scenes of Fulton's life and an appreciation. The appendixes are full of interest to the student who wishes fuller details, and does not care simply for results.

It is to be noted that Mr. Dickinson is an Englishman, so that we in this country can rejoice all the more at the admirable biography he has written. He says of Fulton,

He was a born engineer of the same type as James Watt and Thomas Telford, who had no greater amount of training in the direction of their

future careers. To mention as the offspring of Fulton's genius only the first workable submarine torpedo-boat, the first commercially practicable steam vessel, and the first steam propelled warship, is to entitle him to a place among the giants of the engineering profession.

The book will prove highly interesting to every reader who enjoys the story of successful achievement, but engineers and scientific men generally will derive a keener enjoyment, as they watch the development of the trained scientific mind. It will mean little to the general reader but much to the engineer to note how "he was the first to treat the elementary factors in steamship design: dimensions, form, horsepower, and speed in a scientific spirit; to him belongs the credit of having coupled the boat and the engine as a working unit."

In fact Fulton, more than a hundred years ago, realized what our engineering schools have only begun to emphasize recently—that an engineering device to be a success must pay a profit; otherwise it is a mechanical toy. Before Fulton, others had built steamboats which moved through the water, and thus were mechanically successful. Fulton, in the *Clermont*, was the first to build a steamboat that could earn a profit. Mr. Dickinson is to be congratulated on the clearness with which he has developed this important point, and we say finally that the reading of his book has been a great pleasure.

WALTER M. MCFARLAND.

Quellen und Darstellungen zur Geschichte der Burschenschaft und der Deutschen Einheitsbewegung. Im Auftrage der Burschenschaftlichen Historischen Kommission in Gemeinschaft mit Ferdinand Bilger, Wilhelm Hopf, Friedrich Meinecke, Otto Oppermann, Paul Wentzcke, herausgegeben von HERMAN HAUPT. Band IV. (Heidelberg. 1913. Pp. vii, 399.)

THESE *Quellen* represent a labor of love of certain graduate members for the student organization, called the Burschenschaft, with which they were connected in their undergraduate days and toward which they have maintained a respectful attachment in after life, largely because of its historic rôle in spreading the gospel of German unity at a time when that gospel was far from welcome. *Quellen*, in respect of the Burschenschaft, the essays composing this fourth volume of the series undoubtedly are, but in respect of the larger field of German unity, which they also undertake to serve, they are at best hardly more than remote back-eddies. And yet as back-eddies may, on close scrutiny, surrender a great deal of information of a rather recondite sort, so the quiet waters into which these scattered contributions take us reveal conditions and opinions, especially in educated, provincial circles, that the historian, occupied with far-sounding ministerial decrees and irresistible economic forces, is apt to overlook. The beginnings of the Burschenschaft at Jena following the patriotic fervor released by the Wars of Liberation, the infantile diseases of the young organization, the professorial in-